



U.S. Department of Commerce
BUREAU OF THE CENSUS

Fluid Power Products, Including Aerospace

1988

MA35N(88)-1
Issued November 1989

SUMMARY OF FINDINGS

The statistics in this publication represent total U.S. shipments of fluid power products, including aerospace.

Shipments of fluid power products, including aerospace in 1988 totaled \$6,673.2 million, a 10-percent increase from the 1987 total of \$6,068.3 million. The 1988 total includes hydraulic and pneumatic valves, \$1,674.5 million, an increase of 11 percent from the 1987 total of \$1,512.2 million; fittings and assemblies for tubing and hose, excluding plumbers brass goods, \$1,406.2 million, an increase of 7 percent from the 1987 total of

\$1,253.5 million; hydraulic and pneumatic cylinders, actuators, accumulators, cushions and nonvehicular shock absorbers, \$1,805.7 million, an increase of 5 percent from the 1987 total of \$1,718.8 million; filters of hydraulic and pneumatic fluid power systems, \$323.2 million, an increase of 15 percent from the 1987 total of \$280.2 million; hydraulic fluid power pumps, motors, and hydrostatic transmission components, \$1,463.5 million, an increase of 12 percent from the 1987 total of \$1,303.6 million.

A description of the survey methodology and related information appears on page 6.

Table 1. VALUE OF SHIPMENTS OF FLUID POWER PRODUCTS (INCLUDING AEROSPACE): 1988 AND 1987

(Value in thousands of dollars)

Product code	Product description	1988	1987
34921	Hydraulic valves, nonaerospace types.....	631,287	550,003
34922	Pneumatic valves, nonaerospace types.....	430,556	391,570
34923	Aerospace type hydraulic and pneumatic valves.....	393,725	387,336
34924	Fittings for metal and plastic tubing used in fluid and power transfer systems (nonaerospace).....	457,762	398,331
34925	Hydraulic and pneumatic fittings and couplings for hose (nonaerospace).....	671,915	605,429
34926	Hydraulic and pneumatic hose or tube end fitting and assemblies (aerospace).....	276,517	249,711
34927	Parts for hydraulic and pneumatic valves.....	218,947	183,338
35692	Filters for hydraulic and pneumatic fluid power systems..	323,237	280,234
35931	Hydraulic and pneumatic cylinders and related items, (nonaerospace).....	891,469	792,790
35932	Hydraulic and pneumatic cylinders and related items, (aerospace).....	623,421	637,327
35933	Parts for hydraulic and pneumatic cylinders, actuators, accumulators, cushions, and nonvehicular shock absorbers.....	290,853	288,635
35941	Hydraulic fluid power pumps and motors.....	1,132,921	1,020,150
35942	Parts for pumps and motors.....	330,606	283,455

Address inquiries concerning these figures to U.S. Department of Commerce, Bureau of the Census, Industry Division, Washington, D.C. 20233, or call James L. Oliver, 763-5573.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Table 2. MANUFACTURERS' SHIPMENTS OF FLUID POWER PRODUCTS (INCLUDING AEROSPACE), BY TYPE: 1988 AND 1987

(Quantity in units; value in thousands of dollars)

Product code ¹	Product description	Number of companies	1988		1987 ²	
			Quantity	Value	Quantity	Value
	Fluid power products, including aerospace.....	(X)	(X)	6,673,216	(X)	6,068,309
3492 pt.	Hydraulic and pneumatic valves and parts.....	(X)	(X)	1,674,515	(X)	1,512,447
	Nonaerospace hydraulic and pneumatic valves.....	(X)	35,566,604	1,061,843	32,752,335	841,573
34921	Hydraulic valves, excluding aerospace type.....	(X)	11,886,925	631,287	10,723,282	550,003
	Directional control (two-, three-, and four-way):					
34921 21	Manual.....	58	2,689,409	172,719	2,716,469	145,526
34921 23	Solenoid.....	52	2,282,478	126,798	1,819,782	115,486
34921 25	Other, including mechanical and pilot operated.....	36	1,543,463	51,476	1,404,455	47,964
34921 33	Pressure control.....	50	1,688,687	90,116	1,320,392	68,746
34921 35	Volume flow control.....	42	2,306,924	63,408	2,076,993	54,475
34921 37	Servovalves.....	19	69,754	43,249	78,194	41,278
34921 41	Combination.....	14	270,197	38,513	248,317	38,792
34921 46	Other, including logic.....	25	1,036,013	45,008	1,058,680	37,736
34922	Pneumatic (air) valves, excluding aerospace type.....	(X)	23,679,679	430,556	22,029,053	381,570
	Directional control:					
34922 51	Manual.....	49	3,700,911	67,476	3,472,946	55,997
34922 53	Solenoid.....	46	6,154,008	200,771	5,167,439	181,074
34922 55	Other, including mechanical.....	34	1,431,051	25,341	1,188,552	20,342
	Pressure control:					
34922 61	Filter-regulator combination units.....	14	559,454	13,999	423,295	11,053
34922 62	Filter-regulator-indicator combination units.....	13	3,051,921	38,162	3,389,831	44,692
34922 64	Other pressure control.....	13	3,910,029	47,877	3,193,669	39,198
34922 65	Volume flow control.....	32	3,243,354	20,480	3,280,171	20,167
34922 69	Other, including logic and combination.....	23	1,628,951	16,450	1,913,150	19,047
34927 96	Parts for nonaerospace hydraulic and pneumatic valves, sold separately.....	88	(X)	113,756	(X)	81,134
34923	Aerospace type fluid power (hydraulic and pneumatic) valves.....	(X)	1,321,267	393,725	1,288,065	387,336
	Hydraulic:					
	Two-, three-, and four-way directional control valves:					
34923 71	Manually or mechanically operated.....	16	117,294	32,050	89,034	28,526
34923 72	Solenoid operated.....	22	39,879	51,997	51,416	47,387
34923 73	Motor operated.....	4	13,884	10,875	14,865	11,482
34923 74	Electrohydraulic servo valves.....	5	37,337	50,076	38,798	53,618
34923 75	Flow pressure, and other types of hydraulic control valves n.e.c., including relief valves, fuses, pressure regulators, flow regulators, check valves, and similar valves.....	27	605,679	94,014	587,899	110,226
34923 79	Pneumatic valves, all types.....	30	487,194	154,713	506,453	136,097
34927 98	Parts for aerospace type fluid power (hydraulic and pneumatic) valves, sold separately.....	32	(X)	105,191	(X)	92,204
3492 pt.	Fluid power fittings and assemblies.....	(X)	(X)	1,406,194	(X)	1,253,471
34924	Fittings for and assemblies of tubing and hose (nonaerospace type) used in fluid power transfer system.....	(X)	(X)	457,762	(X)	398,331
	Fittings and couplings for tubing:					
	Metal, flared types:					
34924 11	Brass and bronze (SAE 45 degrees and 37 degrees) (thousand lbs.).....	13	(X)	49,386	(X)	46,476
34924 13	Carbon steel (JIC 37 degrees) (thousand lbs.).....	17	(X)	53,711	(X)	42,947
34924 15	Other, including alloy steel (thousand lbs.).....	14	(X)	30,486	(X)	26,345
	Metal, flareless types:					
34924 21	Brass and bronze (thousand lbs.).....	30	(X)	133,346	(X)	114,685
34924 23	Carbon steel (thousand lbs.).....	23	(X)	32,514	(X)	28,258
34924 24	Stainless steel (thousand lbs.).....	28	(X)	118,429	(X)	106,716
34924 28	Other, including alloy steel (thousand lbs.).....	17	(X)	12,131	(X)	10,396
34924 38	Nonmetal fittings, including plastic (thousand lbs.).....	11	(X)	11,842	(X)	9,852
	Assemblies (fittings and tubing that are connected) of metal and/or nonmetal tubing:					
34924 41	Assemblies of tubing.....	8	(X)	8,361	(X)	6,930
34924 42	Assemblies of tubing and hose.....	5	(X)	7,536	(X)	5,736
34925	Hose fittings and couplings (nonaerospace type).....	(X)	(X)	671,915	(X)	605,429
34925 44	Hydraulic and pneumatic permanent hose end fittings (crimped and swaged).....	35	(X)	155,479	(X)	135,264
34925 46	Hydraulic and pneumatic reusable end fittings.....	25	(X)	93,395	(X)	82,026
34925 47	Hydraulic quick connect and disconnect couplings.....	22	(X)	74,636	(X)	66,100
34925 48	Pneumatic quick connect and disconnect couplings.....	24	(X)	57,213	(X)	54,886
34925 49	Manifolds and manifold assemblies, including valve sub plates.....	18	(X)	7,969	(X)	7,067
34925 50	All other, including steel adaptor connectors, swivel, rotating, and extension fittings.....	19	(X)	54,984	(X)	40,838
	Hydraulic and pneumatic hose assemblies:					
34925 51	Permanent end fitting types.....	25	(X)	167,371	(X)	156,512
34925 53	Reusable end fitting types.....	8	(X)	60,688	(X)	61,134
34926	Aerospace type fittings for and assemblies of tubing and hose used in fluid power transfer system.....	(X)	(X)	276,517	(X)	248,711
34926 61	Hose and tubing assemblies, including assemblies which combine tubing and hose.....	7	(X)	50,390	(X)	48,131
34926 62	Quick connect fittings, rotating, swivel, and extension fittings.....	8	(X)	29,196	(X)	18,654
34926 63	Manifolds and manifold assemblies, including manifolds with filters, valves, and similar items installed.....	11	(X)	41,066	(X)	42,154
34926 69	Fittings for hose and tubing n.e.c.....	18	(X)	155,865	(X)	139,772

See footnotes at end of table.

Table 2. MANUFACTURERS' SHIPMENTS OF FLUID POWER PRODUCTS (INCLUDING AEROSPACE), BY TYPE: 1986 AND 1987--Continued
(Quantity in units; value in thousands of dollars)

Product code ¹	Product description	Number of companies	1986		1987 ²	
			Quantity	Value	Quantity	Value
35692 --	Filters for hydraulic and pneumatic fluid power systems.....	(X)	(X)	323,237	(X)	280,234
	Filters for hydraulic fluid power systems, excluding aerospace:					
35692 11	Hydraulic fluid filter assemblies, with or without filter element installed:					
35692 13	Low pressure (below 300 p.s.i.).....	31	1,052,703	28,622	936,158	25,799
	High pressure (300 p.s.i. and above).....	20	292,467	18,975	184,391	14,847
	Filter replacement elements:					
35692 13	Reusable (cleanable) type.....	19	343,490	7,964	391,908	7,265
35692 17	Nonreusable type.....	29	12,552,494	72,403	9,908,343	59,415
35692 19	Strainers and separators, other contaminant removal devices and filter parts and accessories.....	28	(X)	34,487	(X)	32,583
	Filters for pneumatic fluid power systems:					
35692 31	Air supply filter assemblies and filter replacement element, including coalescers, excluding those shipped as part of a filter-regulator or filter regulator-lubricator combination unit (including parts).....	26	(X)	63,386	(X)	58,507
35692 38	Air exhaust mufflers, diffusers, filter parts, accessories, and contaminant removal devices.....	18	(X)	12,294	(X)	7,380
35692 50	Filters and filter replacement elements for aerospace fluid power (hydraulic and pneumatic) systems, all types.....	10	(X)	85,101	(X)	74,438
3593 --	Hydraulic and pneumatic cylinders, actuators, accumulators, cushions, and nonvehicular shock absorbers.....	(X)	(X)	1,805,743	(X)	1,718,752
	Nonaerospace hydraulic and pneumatic cylinders, actuators, accumulators, cushions, and nonvehicular shock absorbers.....	(X)	(X)	891,469	(X)	792,790
35931 --	Hydraulic and pneumatic cylinders (linear actuators):	(X)	(X)	14,504,209	(X)	12,537,879
	Hydraulic cylinders:					
	Tie-rod types:					
35931 09	Standard NFPA and JIC tie-rod types.....	34	358,470	92,994	346,616	88,644
35931 10	Other tie-rod types, including ASAF.....	22	199,130	35,885	306,229	28,870
35931 12	Weld fused.....	52	1,408,312	215,485	1,364,789	176,643
35931 13	Telescoping.....	30	67,412	57,695	57,166	46,168
35931 14	Threaded.....	38	579,711	128,613	846,455	140,384
35931 15	Mill type.....	14	25,390	24,581	24,062	17,641
35931 16	Other, including combinations.....	13	130,215	126,226	16,736	
	Pneumatic cylinders:					
35931 21	Tie-rod types.....	39	935,721	100,232	865,273	95,533
35931 22	Other.....	56	10,599,833	119,519	8,597,053	94,324
	Hydraulic and pneumatic actuators, accumulators, cushions, and nonvehicular shock absorbers:	(X)	(X)	993,363	(X)	858,120
	Hydraulic and pneumatic rotary actuators, limited rotation:					
35931 25	Hydraulic rotary actuators.....	16	42,262	21,783	43,524	25,333
35931 26	Pneumatic rotary actuators.....	14	49,489	13,681	41,861	10,304
35931 31	Accumulators (fluid power), including hydraulic, hydropneumatic, pneumatic, etc.....	26	86,049	24,878	65,692	23,158
35931 33	Shock absorbers, not for vehicle suspension, hydraulic and pneumatic.....	2	814,763	32,717	707,043	29,052
35931 35	Cushions (fluid power), nonlinear, including hydraulic, hydropneumatic, pneumatic, etc.....					
35931 36	Parts for aerospace type fluid power (hydraulic and pneumatic) cylinders, actuators, accumulators, cushions, and nonvehicular shock absorbers, sold separately.....	100	(X)	181,492	(X)	175,771
35932 --	Aerospace type fluid power (hydraulic and pneumatic) cylinders, actuators, accumulators, cushions, and related items.....	(X)	(X)	623,421	(X)	637,327
	Hydraulic servo-actuator assemblies (linear and rotary):					
35932 31	Mechanical input.....	9	12,705	68,726	11,567	66,455
35932 32	Electrical input.....	8	17,570	56,905	15,659	62,478
35932 35	Combination input.....	9	51,824	328,737	56,028	357,514
	Hydraulic utility actuators:					
35932 61	Linear actuators (cylinders).....	15				
35932 82	Rotary actuators (limited rotation).....	3	20,958	40,144	20,157	39,034
35932 71	Shock absorbers, snubbers, and cushions, all types excluding oleo strut assemblies.....	9	180,657	17,423	160,209	14,852
35932 72	Pneumatic actuators and actuator assemblies (linear and rotary).....	10	56,516	52,138	53,204	49,132
35932 73	Accumulators and other hydraulic, pneumatic or combination devices for fluid energy absorption and/or storage.....	10	33,600	26,215	28,356	21,389
35932 74	Hydraulic fluid reservoirs and reservoir assemblies, including "bootstrap" reservoirs, spring pressurized reservoirs, and similar reservoirs; and reservoirs with integral valves and/or filters.....	6	1,934	7,718	2,715	8,847
35932 79	Other aerospace type fluid power cylinders, actuators, accumulators, cushions, and related items h.v.o.....	13	(X)	22,413	(X)	17,516
35933 98	Parts for aerospace type fluid power (hydraulic and pneumatic) cylinders, actuators, accumulators, cushions, and related items sold separately.....	23	(X)	109,361	(X)	112,864
3594 --	Fluid power pumps and motors.....	(X)	(X)	1,463,527	(X)	1,303,605
35941 --	Hydraulic and pneumatic fluid power pumps and motors.....	(X)	(X)	1,152,921	(X)	1,020,150
	Nonaerospace:					
	Pumps, variable displacement closed loop hydrostatic transmission type:					
35941 13	Vane type.....	1				
35941 14	Radial piston type.....	3	78,790	14,024	71,199	10,655
35941 15	Axial piston type.....	13	231,321	90,471	177,005	75,593
	Pumps, variable displacement, open loop only:					
35941 20	Vane type.....	4				
35941 26	Radial piston type.....	2	64,606	28,865	54,105	23,181
35941 27	Axial piston type.....	13	168,276	68,552	142,803	52,230
	Pumps, fixed displacement, open and closed loop:					
35941 30	Internal gear type (including gerotor).....	17	1,000,098	114,152	857,424	97,227
35941 34	External gear type.....	15	802,259	80,127	729,126	72,313
35941 35	Vane type.....	5	434,802	73,541	356,121	57,025
35941 36	Radial piston type.....	7	48,970	19,819	39,007	16,696
35941 37	Axial piston type.....	19	148,787	55,804	156,314	61,535

See footnotes at end of table.

Table 2. MANUFACTURERS' SHIPMENTS OF FLUID POWER PRODUCTS (INCLUDING AEROSPACE), BY TYPE: 1988 AND 1987--Continued

Product code ¹	Product description	Number of companies	1988		1987 ^F	
			Quantity	Value	Quantity	Value
	Fluid power pumps and motors--Continued					
	Hydraulic and pneumatic fluid power pumps and motors--Continued					
35941 39	Other pump and pump packages n.e.c.....	28	512,939	127,697	690,827	142,952
	Hydraulic and pneumatic motors (continuous rotation):					
	Shipped separately:					
35941 40	Pneumatic (air) motors.....	5	¹ 150,060	¹ 14,712	¹ 143,026	¹ 16,366
	Hydraulic motors (except aerospace):					
35941 41	Gear type, internal and external, including gerotor.....	20	1,246,707	120,454	1,112,460	110,709
35941 42	Vane type, fixed and variable.....	9	23,754	14,254	9,284	6,106
35941 43	Radial piston type, fixed and variable.....	8	60,996	24,065	74,306	25,315
	Axial piston type:					
35941 44	Fixed displacement.....	13	190,092	46,646	165,621	39,515
35941 45	Variable displacement.....	9	19,685	21,163	28,364	14,296
35941 46	Motor types n.e.c.....	-	-	-	-	-
35941 50	Value of drivers shipped with pumps (value only).....	10	(X)	21,218	(X)	18,117
	Aerospace:					
	Hydraulic pumps:					
35941 71	Fixed and variable displacement types.....	10	19,077	83,161	20,579	83,986
35941 72	Pump/electric motor assemblies, fixed, and variable displacement types.....	8	96,614	61,808	4,803	38,633
35941 73	Other pump packages n.e.c.....	7	2,201	9,645	2,174	10,435
	Motors:					
35941 83	Pneumatic (air) motors and motor packages.....	1	(¹)	(¹)	(¹)	(¹)
35941 86	Hydraulic motors, fixed and variable displacement types.....	4	7,777	19,515	9,487	47,265
35941 87	Hydraulic motor packages, including motor/gearbox, motor/valve, motor/generator, and similar combination units.....	3	1,576	23,228		
35942	Parts for pumps and motors.....	(NA)	(X)	330,606	(X)	283,455
	Hydraulic:					
35942 91	Nonaerospace.....	54	(X)	256,120	(X)	213,779
35942 93	Aerospace.....	12	(X)	74,486	(X)	69,676
	Pneumatic:					
35942 95	Nonaerospace.....	-	(X)	-	(X)	-
35942 97	Aerospace.....	-	(X)	-	(X)	-

- Represents zero. (NA) Not available. N.e.c. Not elsewhere classified. pt. Partial. ^FData for 1987 has been revised extensively based on the reconciliation with the 1987 Census of Manufactures. (X) Not applicable.

¹Pneumatic (air) motors for aerospace and nonaerospace were combined to avoid disclosure of individual company data.

Table 3. COMPARISON OF VALUES OF SHIPMENTS OF SELECTED FLUID POWER PRODUCTS (INCLUDING AEROSPACE), AS REPORTED IN THE MA35N, THE 1987 AND THE 1982 CENSUSES OF MANUFACTURES

(Value in thousands of dollars)

Product code	Product description	1987		1982	
		MA35N	Census of Manufactures ^P	MA35N	Census of Manufactures
34921	Hydraulic valves, nonaerospace.....	550.0	515.3	443.7	412.9
34922	Pneumatic valves, nonaerospace.....	391.6	375.7	343.0	303.2
34923	Aerospace hydraulic and pneumatic valves.....	387.3	377.2	255.5	266.9
34927	Parts for hydraulic and pneumatic valves.....	183.3	165.3	107.2	87.5
34924	Fittings for metal and plastic tubing (including assemblies), nonaerospace.....	398.3	438.6	295.0	302.1
34925	Fittings and couplings for hose (including assemblies), nonaerospace.....	605.4	522.1	329.0	313.3
34926	Aerospace fittings for tube and hose (including assemblies).....	249.7	303.9	117.3	122.6
35692	Filters for hydraulic and pneumatic fluid power systems.....	280.2	252.7	202.9	188.4
35931	Hydraulic and pneumatic cylinders and related items, nonaerospace.....	792.8	760.8	609.4	629.3
35932	Aerospace hydraulic and pneumatic cylinders.....	637.3	687.5	291.1	304.8
35933	Parts for hydraulic and pneumatic cylinders and related items...	288.6	344.9	116.1	119.0
35941 10	Fluid power pumps and motors.....	1,020.2	1,195.8	707.9	733.6
35942 10	Parts for pumps and motors.....	283.5	347.5	284.1	297.8

Note: Totals may not add due to independent rounding.

^PPreliminary.

DESCRIPTION OF SURVEY

Scope of Survey. This survey covers producers of fluid power products, including aerospace, except very small firms (generally less than 20 employees) for which 1987 Census of Manufactures data were derived from administrative records of other government agencies.

Survey Methodology. The statistics in this publication were collected by mail on Bureau of the Census annual Form MA35N, Fluid Power Products, Including Aerospace Products. The survey panel includes all known producers of fluid power products, approximately 460 companies. This survey does not include products produced and consumed within the same establishment.

Reliability of Data. Survey error may result from several sources: (1) inability to obtain information about all cases in the survey; (2) response errors; (3) definitional difficulties; (4) differences in the interpretation of questions; (5) mistakes in recording or coding the data obtained; and (6) other errors of collection, response, coverage, and estimation for missing data. These nonsampling errors also occur in complete censuses. Although no direct measurement of the biases due to nonsampling errors has been obtained, precautionary steps were taken in all phases of the collection, processing, and tabulation of the data in an effort to minimize their influence.

A major source of bias in the published estimates is due to imputing data for nonrespondents, for late reporters, and for data which fail logic edits. Missing figures are imputed based on yearly movements shown by reporting firms. Imputation generally is limited to a maximum of 10 percent for any one data cell. Figures with imputation rates greater than 10 percent are footnoted.

The imputation rate is not an explicit indicator of the potential error in published figures due to nonresponse because the actual yearly movements for nonrespondents may or may not closely agree with the imputed movements. The range of difference between the actual and imputed figures is not precisely known, but is assumed to be small. The degree of uncertainty regarding the accuracy of the published data increases as the percentage of imputation increases. Figures with imputation rates above 10 percent should be used with caution.

Revisions to Previous Period Data. Statistics for previous years may be revised as the result of corrected data from respondents, late reports for which imputations were made as described above, or other corrections. Figures which have been revised by more than 5 percent from previously published figures are indicated by footnotes.

Revisions include changes to prior period data resulting from reconciliation of the results of this survey with the 1987 Census of Manufactures to correct differences

in reported data between the two series and to identify and verify new establishments included in the scope of this survey. Table 3 presents a comparison of data from the two series by census product class following the reconciliation.

Adjustment for Price Change. All dollar figures included in this publication are in current dollars; i.e., they have not been adjusted for price change.

EXPLANATION OF TERMS

Quantity and Value of Shipments. The figures on quantity and value of shipments represent physical shipments of all products sold, transferred to other establishments of the same company, or shipped on consignment, whether for domestic or export sale. The value represents the net sales price, f.o.b. plant, to the customer or branch to which the products are shipped, net of discounts, allowances, freight charges, and returns. Shipments to a company's own branches are assigned the same value as comparable sales to unaffiliated customers; i.e., the value includes an appropriate allocation of company overhead and profit. Products bought and resold without further manufactures are excluded.

Hydraulic Valves. Devices used to regulate or control the direction, pressure, or volume of hydraulic fluid flowing through a hydraulic fluid power system.

Pneumatic (Air) Valves. Devices used to regulate or control the direction, pressure, or volume of air flowing through a pneumatic fluid power system.

Pneumatic (Air) Motors, Continuous Rotation. Devices that convert pneumatic(air) fluid power (pressure) into rotary mechanical force and motion, with the capability of continuous unimpeded rotation in a single direction.

Hydraulic Fluid Power Pumps. Devices that convert mechanical force and motion into hydraulic fluid power.

Hydrostatic Transmissions. A combination of hydraulic pumps, motors, controls, and related components that can transmit rotary motion with variably controlled direction, speed, and torque output. Integral transmissions contain all components within a single assembly.

Hydraulic and Pneumatic Cylinders. Devices that convert hydraulic or pneumatic fluid power into linear mechanical force and motion.

Hydraulic and Pneumatic Rotary Actuators. Devices that convert hydraulic or pneumatic fluid power into rotary mechanical force and motion, where the rotary motion is limited to a fixed arc.

Accumulators (Hydraulic Only). Devices that store hydraulic fluid under pressure as a source of fluid power.

Cushions and Shock Absorbers (Hydraulic and Pneumatic). Devices that provide controlled resistance or deceleration to motion. Cushions resist nonlinear motion. Shock absorbers resist linear motion.

Hose or Tube Fittings. Devices used to connect hose or tubing to other components in a fluid power system.

Hose or Tube Assemblies. Performed and/or cut-to-length hose or tube with fittings attached at both ends used to connect components in a fluid power system.

HISTORICAL NOTE

Data on fluid power products have been collected by the Bureau of the Census since 1981. Historical data may be obtained from Current Industrial Reports available at your local Federal Depository Library. A list of these libraries may be obtained from the Bureau of the Census regional offices:

Office	Telephone
Atlanta, Georgia	(404) 347-2271
Boston, Massachusetts	(617) 223-2327
Charlotte, North Carolina	(704) 371-6142
Chicago, Illinois	(312) 353-6251
Dallas, Texas	(214) 767-0621
Denver, Colorado	(303) 236-2200
Detroit, Michigan	(313) 226-7742
Kansas City, Kansas	(816) 374-4601
Los Angeles, California	(213) 209-6616
New York, New York	(212) 264-3860
Philadelphia, Pennsylvania	(215) 597-4920
Seattle, Washington	(206) 442-7828

Historical data are also available on microfiche. For further information contact the Bureau of the Census, Data User Services Division, (301) 763-4100.

RELATED REPORTS

The Bureau of the Census publishes the following related reports:

Series	Frequency	Title
<i>Current Industrial Reports</i>		
MQ35D	Quarterly	<i>Construction Machinery</i>

Series	Frequency	Title
MA35A	Annually	<i>Farm Machinery and Lawn and Garden Equipment</i>
MA35F	Annually	<i>Mining Machinery and Mineral Processing Equipment</i>
MA35L	Annually	<i>Internal Combustion Engines</i>
MA36F	Annually	<i>Major Household Appliances</i>
MA36G	Annually	<i>Transformers</i>

CONTACTS FOR DATA USERS

Subject Area	Contact	Phone Number
Current Industrial Report MA35N	James Oliver	(301) 763-5573
Classifications Systems Comparability	Francis McCormick (ESD)	(301) 763-1935
Census/ASM	Ted McGrath	(301) 763-5752
International Trade Administration	Edward McDonald	(202) 377-0680
International Trade Commission	Ronald DeMarines	(202) 523-0259
To order a Current Industrial Report	Superintendent of Documents (GPO)	(202) 783-3238
To subscribe to a Census Bureau publication	Superintendent of Documents (GPO)	(202) 275-3054

INDUSTRY FINANCING

This survey is funded, in part, by the National Fluid Power Association.

ACKNOWLEDGMENTS

This report was prepared in the Industry Division, Bureau of the Census, under the direction of Malcolm E. Bernhardt, Chief, Current Durables Branch, and Kenneth E. McBeth, Chief, Machinery and Equipment Section. James Oliver was directly responsible for the review of the data and preparation of the report. Gaylord E. Worden, Chief of the Division, and Robert N. Tinari, Assistant Chief for Current Industrial Reports, provided overall direction and coordination to this project.

U.S. Department of Commerce
BUREAU OF THE CENSUS
Washington, D.C. 20233

Official Business
Penalty for Private Use, \$300

FIRST-CLASS MAIL
POSTAGE & FEES PAID
CENSUS
PERMIT No. G-58

